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Synopsis of the thesis

MORPHOTECTONICS ATTRIBUTES OF WATER DIVIDE AREA BETWEEN PURNA AND PENGANGA RIVER, BULDHANA DISTRICT, MAHARASHTRA, INDIA

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(M.Sc., M.Phil.)

Proposed to be submitted

In Partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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2023-24

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Abstract:

An investigation of tectonically active area/ basins have been discussed earlier in M.Phil thesis with the help of morphometric attributes and GIS. The thesis enlightened the tectonically active and inactive sub-basins of Purna and Penganga river basin in West Central Deccan Volcanic Province around Lonar Crater, Buldhana and Jalna District. This study is carried out with refrence to the parameters including bifurcation ratio, drainage density, drainage texture, stream frequency and elongation ratio, likewise all morphometric parameters. This study is statistically done by GIS platform. In characterization and understanding the evolution of landforms study of the morphometry plays a vital role. The earlier study shows the selected sub-basins are in early mature stage of erosional development and are tectonically active. Now we have to check if, this tectonically prone area is either restricted or not. Water divide area between Purna and Penganga river is also affected by neotectonism or by structural control. This study can be profitable to studying the adjoining area / basins of Purna and Penganga river in Buldhana district, Maharashtra with the help of Morphotectonic attributes.

1. Introduction

Geomorphology is the study of landforms and landform evolution. The topic traditionally has been studied both qualitatively, which is the description of landforms, and quantitatively, which is process-based and describes forces acting on Earth's surface to produce landforms and landform change. The geomorphologic processes as a balance of forces that result in the varied landforms observed across Earth's surface. The reflection of these processes is expressed in the crust by geologic structures and deformations. The study of geomorphology and tectonics is combinely refered to as 'Morphotectonics.' Geologically, the entire study area lie in the Buldhana district of Maharashtra is covered by the Deccan trap formation comprising nearly horizontal lava flows. The flows have been considered to be a result of lava eruption during late cretaceous to early Eocene period. The types of basalt occurring in the area are compact basalt, vesicular and amygdaloidal basalt. Red bole and green bole are also occurring in the area. The entire study area is fall in Purna and Penganga river catchment area. Dendritic drainage pattern is common. The drainage pattern near Lonar lake is the impact of meteorite "Elongated radial pattern" is transformed into "circular centripetal pattern". All sub-basins surrounding Lonar crater are tectonically active and in early mature stage of erosional development. Above entire study has been carried out in M.Phil in 2022. The study is extended at water divide area between Purna and Penganga river by the help of morphometry.

2. Review of Literature

Earlier, the manual techniques have been used to calculate the geometry of the landscape (Horton,945; Miller953; Coates,958). The measurement of these parameters through toposheets is time consuming. In960s and early970s, the availability of computers made it possible so identify landscape features based on statistical methods.The present study area is lie in the Buldhana and Jalna districts of Maharashtra is covered by the Deccan trap formation comprising nearly horizontal lava flows. The flows have been considered to be a result of lava during late cretaceous to early Eocene period. The study area is a part of Deccan Volcanic Province which generally shows pipe amygdales flows shows irregular vesicles at the bottom of the flow, and columnar jointing patterns (Kale and Kulkarni912). The present study is an extended part of M.Phil thesis.

Qualitative and quantitative analysis of landscapes and identification of regions experiencing tectonic deformation was made possible by using geomorphic indices (Keller and Pinter,996). These approaches numerically define land surface parameters, and therefore have been successfully applied by scientists in order to identify and characterize the landscape of active tectonics. (Strahler952; Pike,995, 2000; Chen et al., 2004; El Hamdouni et al., 2008; Troiani and Della Seta, 2008; Pedrera et al., 2009; Perez-Pena et al., 2009a, 2010; Font et al., 2010; Giaconia et al.,2012; Mahmood and Gloaguen, 2012; Gioia et al., 2014; Giachetta et al.,2015; Manoj et al., 2016).

The earlier study have been carried out on the Geology of Lonar Crater and it's impacts. The.88 km-diameter simple crater formed entirely within Deccan traps. Impact-related deformation of the target rock consists of upturned basalt flows in the upper crater walls and recumbent folding around concentric rim, subhorizontal, non-cylindrical fold axes at the crater rim. Also one significant normal fault structure is observed in the crater wall that offsets slightly older layer-parallel slip faults (Maloof et al. 2010).

The study is also carried out on hydrogeology of Lonar Lake (Goro Komatsu et al. 2012) ; environmental characteristics of Lonar Lake (Babar Md. 2007) ; mineralogical mapping in the Lonar region (Ranjana Gore 2016).

Objectives Proposed

1. To study the morphotectonic attributes of water divide area between Purna and Penganga river , Buldhana district, Maharashtra.
2. To study the tectonic and structural control.
3. To study the soft-sediment deformations.
4. To determine the geomorphic Indices of Active tectonics of the area.

Methodology adopted

The following methodology will be adopted to work out the entire study of water divide area between Purna and Penganga river.
To understand the overall geological setup of the study area collection and appraisal of literature relevant to the present study has been done.
The collection of toposheets and geological maps has been carried out to understand the geology of that area and different drainage patterns in the study area.
Detailed field mapping of Quaternary sediments will be carried out to understand the geology of that area and different drainage patterns in the study area.
Detailed field study of the structures like dykes, potholes, columnar joints, etc. in the study area.
The study of the soft-sediment deformations has been carried out with the help of actual site investigation.
To study of the Quaternary sediments of Purna and Penganga river also carried out through site investigation.
The satellite data will also be used in the study.
The morphometric attributes will useful in the study of morphometry.
The entire morphometry study has been carried out using GIS platform.
Apart from it, the actual site investigation and GIS is also useful in the present study

5. Importance of study

International

This study enlightened the fact of landform evolution of Purna and Penganga river. Either it is normal, tectonically active or of neotectonism.

National

The morphometric attributes of water divide area between Purna and Penganga river in Buldhana district, Maharashtra through a light on tectonic and structural control of that area.

Significance of the study

The study carry out the morphometry of the region and its relation with structures developed.

The study reveals the points that explain how morphometry is useful tool to characterize the hidden structures in the region and the evolution of landform.

6. Proposed work plan

The Literature relevant to the present study used as a previous study guide. The Remote sensing techniques could be used for the identifying the study region. The image interpretaion is then applied to identify the study region with Google Earth Imageries. Based on these imageries preliminary surveys are to be planned and could identify accessible sites in the study region. Further the region can be selected to study and is can be attempted to visit. Then, detailed field investigation has been planned. The visits are then intended to find out tectonic and neotectonic structures also using GIS platform. All features are co-relate and reach upto the final conclusion of the study.

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